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CONSUMPTION:

HOW TO GET IT, AND HOW TO GET RID OF IT.

BY

R. W. PHILIP, M.A., M.D., F.R.C.P.

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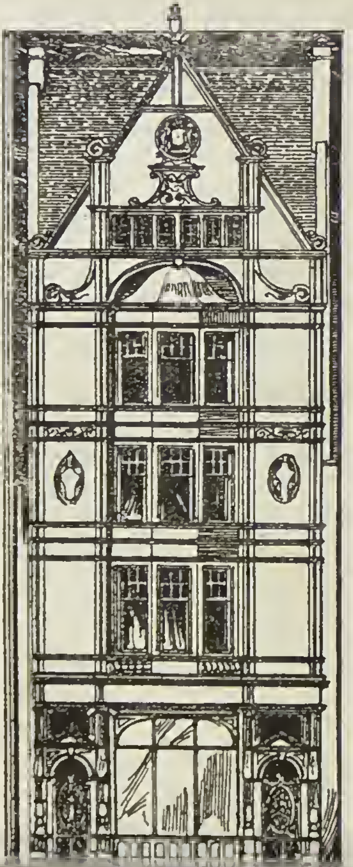

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CONSUMPTION: HOW TO GET IT, AND HOW TO GET RID OF IT.

By R. W. PHILIP, M.A., M.D., F.R.C.P.

Ladies and Gentlemen,—There are two very good reasons why your Committee has thought it right that the subject of Consumption should be brought under your notice this evening. In the first place, as we all know, the disease stands a long way foremost in respect both of prevalence and of mortality, so far as this country is concerned. It is at once the scourge and the opprobrium of our nineteenth century civilisation. This is the dark side of the picture I have to place before you to-night. In the second place,—and this is the bright obverse—it will be admitted by all that never, in the history of medicine, has such a big, united effort been made as now to rout and disarm the deadly foe. The last decade has seen an infinitely greater advance in our effective knowledge of the disease than had been witnessed collectively by all the thousands of years which have come and gone since man's first disobedience brought death into the world. The physician's energies have been roused as never before, and the nations are vying with each other in the holy war against this destruction which wasteth at noon-day. We are now, I believe, on the threshold of great advances which will revolutionise our treatment, as our conceptions of the disease have already changed.

It will, therefore, be my endeavour, in what I have to say, to explain to you, so far as time may permit, (1) How Consumption is got—*i.e.*, its nature, the causes of its prevalence, and the degree of its mortality; and (2) How Consumption is to be got rid of, both individually and by the community.

I. *How to get Consumption.*

In order to answer this, it is essential that we have a clear conception of what consumption is. The term consumption is a curious relic of the past. It has reference to the effect of the disease as recognised popularly. In its most general sense, it means a wasting or decline. The poor consumptive's flesh was seen to waste, and his strength to decline, and men said he was in a consumption. In olden times, many different diseases were doubtless included in the term, and its meaning was consequently somewhat vague, just as probably the terms "plague" and "leprosy" included in the ordinary parlance of the middle ages a number of forms of disease radically different from each other.

But it is to "Consumption" in its stricter sense that I wish to invite your attention now. Such consumption is essentially a wasting, due directly to the presence of a specific disease of the *lung*. In other words, what is popularly dreaded is pulmonary consumption, or consumption of the lungs.

It is necessary, then, that we have perfectly clear views as to what is meant by a "specific disease." By specific diseases we mean those diseases whose production is, or may fairly be supposed to be, traceable to the presence and influence of specific living organisms within the affected body.

It would take us too far a-field to-night to enter on a discussion of the so-called germ theory of disease. In an earlier lecture of the present session, "On our Invisible Friends and Foes," you had an account of some of the more practical results of this "germ theory," and you heard about some of the diseases which have been associated with different germs. It is well that we realise clearly—once and for all—that the germ doctrine rests no longer on theory, but on established facts, so far as Pulmonary Consumption is concerned.

For a great many years there had been manifested a growing feeling that the symptoms and natural history of consumption were best explained on the supposition of the presence of some parasite. So far back even as 1722, a kind of prophetic guess had been made—in very vague fashion—that consumption was caused by "animalcules in the lungs." But little stress was laid on this and similar suggestions, which were admittedly random shots. And for long, opinion as to the causation of the disease was divided between two schools. The first of these traced the development of the disease to the growth of little tumours or tubercules within the lung; the second, holding that these changes were not primary, but consequent on the disease, sought for the explanation of all consumption in the theory of "neglected colds." In both of these doctrines there was an element of truth, but very far from the whole truth, and there was a suggestion in each of something which was not the truth.

Some twenty-five or thirty years ago, men's minds became more keenly alive to the probability of what we may call the "animalcule" notion. In 1850 it was demonstrated that little rod-like bodies or bacilli were to be found in the bodies of animals which had died of the disease known as anthrax; and in 1863 it was further proved that these bacilli were really the cause of the disease,—in other words, that by the introduction of the bacillus anthracis, or its spores, into the healthy body, the disease could be reproduced. Two years later—*i.e.*, in 1865—it was shown, regarding consumption, that if the expectoration of consumptive patients, dried and finely powdered, were inhaled by animals, these animals were attacked by consumption. From this time onwards, observers in every country renewed their diligence to discover the cause of this infectiousness, and more than one organism found by microscopic examination was described as responsible. But it fell to the lot of a Berlin doctor—Dr Robert Koch—to reap the first great fruit of his genius, skill, and marvellous perseverance in the incontrovertible discovery of the consumption-laden organism, the bacillus tuberculosis.

In 1882 Dr Koch astounded the scientific world by announcing that the long-sought micro-organism had been found. The bacillus tuberculosis, which I show you (magnified many hundred times), is a very small rod-like body—each individual measuring only about one ten-thousandth part of an inch in length. They sometimes lie alone and apart, but are frequently grouped together in irregular fashion, forming rosette-like masses or short chains. With a good microscope and a high magnifying power, it is easy to make out the presence in many instances of spores inside the rods—the spores being the seeds by means of which the reproduction of the organism is effected. The rods have the peculiar character of taking on and keeping certain dyes or stains, which enables us to discover their presence more easily and certainly (and this love of colour was a most important aid to their detection).

That you may realise on what a certain basis of observed fact this fatal property has been traced to the door of the tubercle bacillus, I must explain to you, in a word or two, how conclusive has been the evidence. Because you must thoroughly understand that the bacillus was not thus condemned unheard. Most able advocates were retained, who endeavoured to show by skilful reasoning, and by the suggestion of all possible theories, that the bacillus was innocent. The trial dragged out a more weary existence than that of the Tichbourne claimant or even the Parnell Commission, and yet the almost unanimous verdict of all who are in any sense called to be judges has been that of "*guilty as libelled.*" And I wish to put the leading points of the evidence before you.

Koch showed, *firstly*, by an examination of some hundreds of cases, that the bacillus was present in every instance of consumption in the affected tissues or organs; and I show photographic and coloured representations of the rod-like bodies in (*a*) the lymphatic glands; (*b*) the lungs; and (*c*) the expectoration from a consumptive patient. *Secondly*, he showed that it was possible to grow the bacillus on certain soils outside the body, just as we can grow flowers and vegetables; and by a careful and difficult process of separation and weeding of the tares, it was found possible to attain a "pure cultivation" of the organism,—just as our gardeners may arrange beds of mignonette without any other flower or weed being present, the only difference being that the microscopic size of the little organisms makes the weeding process somewhat difficult. I show you now photographs of what we term "pure cultivations" of the tubercle bacillus (*a*) in a test-tube, (*b*) on a flat plate. *Thirdly*, Koch showed that it is possible to induce consumption in healthy animals by inoculating them with a little piece taken from one of the pure cultivations to which I have referred. And *lastly*, he proved the presence of the tubercle bacillus throughout the tissues of the animals which had been thus artificially affected.

As I have said, the conviction is absolutely conclusive; and had the tubercle bacilli been, as the wicked Nero would fain have had the Roman people, possessed of but one neck or even one life, their death-knell would long ago have sounded, and consumption have become a sad memory of the past. But the number of bacilli is legion; and if, therefore, so brilliant a consummation has not yet been attained, with knowledge has come power, and knowledge has begotten more knowledge, so that it is no exaggeration to maintain that within the last eight years we have learned more about consumption than for centuries before. Nor is it the expression of a pious imagination or of over-sanguine hope when I announce my belief that the date is no longer indefinitely removed when we shall be able to place our foot on the serpent's head, and say, "O Enemy, now thy destructiveness has a perpetual end!"

But, meanwhile, there is much need of a fuller study and wider dissemination of knowledge regarding the character and habits of the bacillus; and, on the other side, there is need of patience among those who are doing the work, and those who are waiting for the result.

Now I wish to tell you something of how these rod-like organisms enter the human body. They do so by three channels at least: (1) by the respiratory tract, along with the air which we breathe; (2) by the alimentary tract, along with our food; and (3) by open wounds.

The first of these is the most important, and is that which more particularly concerns the subject we have on hand. But I should say, regarding the third, that the knowledge that the access of this and other organisms was easy and might be fraught with serious consequences, through the labours of Sir Joseph Lister,—of whom, in Edinburgh, the birth-place of much of his work, we are justly proud,—and that of others, has been crowned with the highest reward in the modern system of antiseptic surgery.

Regarding the second means of approach,—by way of the alimentary system,—we have to recognise that there is here a special danger more particularly to our children, whose weak point often is their digestive apparatus. It has been proved that a disease identical with human consumption is not uncommon in cattle, and the milk of such tubercular cows has been found to contain active bacilli capable of producing the disease. Similarly, there are grounds for believing that the flesh of tubercular cattle, when taken for food, may induce consumption. This proves the urgent necessity (1) for a most thorough system of inspection of our cow-houses and dairies, our markets and slaughter-houses, and the most parsimonious ratepayer will wisely consider expenditure in this direction as well-spent money; and (2) it points to the necessity for individual care in the preparation of food, especially for young children. The milk and meat must be well chosen, and if there be any possible doubt as to the source of our milk, it is a good plan to thoroughly steam the milk—a process which is easily carried out, and which does not disturb the taste of the milk materially (for when cool, little alteration will be noticed). It is needless to say that all meat should be well cooked.

But it is more particularly to the air passages as a channel of infection of the lungs that I have to refer. And to understand how this comes about, you must remember how the process of respiration is carried on. It would detain us too long to go into this fully, but a few facts must be recalled.

The human face, with its possibilities of endlessly varying beauty, is not a mere ornament. Besides its value in relation to the special senses, it serves as the starting-point of two most important passages or channels,—the passage for food, or the alimentary tract, and the passage for air, or the respiratory tract. There is a special entrance to each of these passages—the mouth and the nose. Commencing side by side, the passages run together for a considerable part of their course, crossing each other where the upper portion of the windpipe is reached. You must realise, however, that the nose is essentially the passage for air, and the mouth is essentially the passage for food,—a fact which nature has herself emphasised by giving us the power to close the mouth voluntarily, while the nose remains constantly open. There are conditions when, as we say, the nose is stuffed, and we breathe through the mouth, or again, when breathing has to be much more rapid. But this, in no sense, disturbs the general statement; and if persons would only breathe, and teach their children to breathe, more constantly through the nose which God gave them, and learn to keep their mouths shut, except for eating and speaking, there would be far fewer colds and kindred affections.

Especially is this of importance at such a season of the year as the present, and particularly in passing from a heated atmosphere, such as this, into the cold air. And in a word, I shall explain to you why. When the air enters the mouth, it passes rapidly back to the upper part of the windpipe, and thus carries directly to the bronchial tube the cold and damp air of night, let us suppose. But when air enters by way of the nose, it is warmed in a marvellous way by the twisted and highly vascular passage through which it courses before reaching the windpipe. There are other advantages, too, in favour of the nose, inasmuch as the length of the passage and the hairs about the entrance act as an important sieve for the catching of dust and other impurities. The function of the nose, too, as the organ of smell, is most important, in the way of warning us when the air of a dwelling-house or other locality is impure, and, therefore, not fit to be breathed.

From the nostrils, the air passes backward to the windpipe, whose upper portion is modified to form the Larynx or voice box (Adam's apple). The windpipe, or trachea, which is a strongly-built tube, passes almost vertically down more or less parallel to the gullet, lying in front of which it can be felt from without. The trachea divides lower down into two branches—the right and left bronchus. Each of these again divide into two, and so on, till a tree-like form is built up, of which the windpipe is the trunk. The smallest branches terminate in little conical dilatations or chambers. These are again divided into secondary chambers or alveoli or air spaces. These delicate air cells are the essential part of the lung, for it is here that the air which is necessary for our life is lodged. They are provided with a most exquisite arrangement of elastic fibre, which allows of their being filled and partially emptied, as we inspire or expire air.

In order that the exchange of air may occur, the lungs must be in constant motion. If you will look at this section of the body, you will understand the more important part of the mechanism whereby this is attained. You see the human body consists essentially of two compartments separated from one another by the midriff or diaphragm. This midriff, however, is not merely a scientific frontier or boundary. It plays a most important part, and it is never two moments quite in the same place. In other words, it is alternately contracting and relaxing. As it contracts it descends, and thus increases the space above. But the lungs fit everywhere perfectly accurately into this upper compartment, and hence when the diaphragm descends (with other associated movements), air must rush in from without to fill up the increased space; and we have just seen that the walls of the healthy air cells of the lung, which always contain some air, are possessed of great elasticity, and so can admit more. In the drawing you see the great increase in the apparent size of the lung during the process of inspiration. As the midriff relaxes again, the size of the upper compartment is lessened, the walls of the chest also relax, in virtue of their own elasticity and weight, and consequently air is expelled from the chest. But the chest is never completely emptied.

While the air has been resident in the chest, most important changes have occurred, as will be seen from the accompanying table.

(1.) It is warmed.
(2.) Its carbonic acid is increased.
(3.) Its oxygen is diminished.
(4.) Its watery vapour is increased.
(5.) A minute amount of organic matter and of free ammonia is added to it.

A definite exchange has been made, by the principle of diffusion—an exchange on whose perfect working depends our health and life. Of the after-course of the oxygen which is inspired with the pure air, it is not my province to speak to-night.

Roughly speaking, you may compare our breathing apparatus to a bellows. That it may work well it is necessary,

(1.) That the frame-work (including the contractile midriff) be in good order.
(2.) That the passages be unobstructed.
(3.) That the air be pure.

The first of these must be self-evident to us all, and yet there are people who imagine they can alter the shape of the human chest without damage to the mechanism, as the interesting figures which I have selected from some of the latest fashion advertisements will indicate. If you will compare these with the healthy outline of the human figure, you will be convinced of the folly of such artists.

Further, there can be little doubt that the constrained positions necessary in certain trades—and even unduly sedentary habits—are prejudicial in this connection. All physicians who have given a thought to the matter are agreed that the absence of healthy chest movement is one of the leading causes of the accumulation of those unhealthy products, whose presence is, in many instances, the starting-point of consumption.

The second demand is equally cogent. We all know the discomfort and sense of suffocation produced by the presence of a "stuffed nose." When the nose is blocked, we fortunately may fall back on the mouth ; but when one of the tubes leading to the lung is blocked or narrowed, the result is far otherwise. The poor asthmatic knows well what it is to stand, as it were, in the ante-room of grim death—simply from want of breath, because his air tubes are partially closed to heaven's freshest breezes.

The third demand — that for pure air — is quite as important as the other two, but unhappily is that least commonly attended to. This arises partly from ignorance, often from sheer obstinacy. It is difficult to say which explanation is the more foolish.

We are, most of us, wonderfully particular about the quality of our food. We think we have a right to complain if we are asked to eat a bad dinner, and we alternately threaten the butcher and scold the cook, or we question the intentions of our host. But, after all, in many cases, the meat is good enough, and in others, though it might be more tempting, it is probably wholesome enough. But we are too often content in our houses, in our meeting places, in our shops and offices, to breathe not merely insufficient air, but air which has been poisoned by the exhalations of others—air that is stifling, through the presence of organic or inorganic impurities—air, it may be, that is deadly through the presence of pestiferous germs and bacilli. And an important difference between a bad dinner and an impure atmosphere is this, that in most instances the effects of the one are comparatively easily corrected, while those of the other may be lasting.

From our present point of view, air, laden with impurities, is extremely dangerous in two directions.

(1.) From what I have told you of the mechanism of respiration, it will be evident that the nearer the air which we breathe comes to the standard of absolute purity, the more easily will the exchange of gases which is necessary for life be carried on; and, conversely, the greater the admixture of foreign elements—even of an inorganic kind—the greater difficulty is likely to occur. Thus, the inspiration of an over-crowded room, filled as it is with carbonic acid, which other people have exhaled, must, quite apart from other elements present, be most prejudicial. So an atmosphere disturbed by the presence of other gases may be absolutely poisonous. Further, we all know how unpleasant it is to drive or walk along dusty roads, when clouds of dust are rolling about. With each inspiration, many of these minute particles are drawn into the air passages. Not only do these take up room which should be better occupied by something else, but they actually are the cause of irritation to the extremely delicate membranes which line the tubes, giving rise to a catarrh, or a peeling off of the fine cells, it may be to a state of bronchitis. This irritation may extend far down the tubes, not only injuring the structures, but placing them in a worse condition for withstanding the approach of malevolent influences of all kinds. Hence it is, for example, that in selecting a climate for patients suffering from chest disease, we choose places free from dusty atmospheres. And this is *one* of the reasons why hilly and mountainous districts have come to be of such value in the treatment of consumption. There are many places where chest disease might suitably be treated, were it not for the preponderating presence of dust in the air.

Most important researches have been made on this subject, and results of great interest have lately been communicated to the Royal Society of Edinburgh by Mr John Aitken, showing how extraordinary the number of dust particles present in a given quantity of air varies in different places. The following table will give you a sufficient idea of the extent of this variation :

Place of Observation.	Date.		Number of Particles.
Kingairloch . .	July 6,	10.30 A.M.	1000
Do. . . .	„ „	1 P.M.	400
Do. . . .	„ „	4.30 P.M.	250
London	June 3,	10 A.M.	102,000
Do.	„ „	1 P.M.	84,000
Do.	„ „	2.30 P.M.	150,000
Paris (Eiffel Tower)	May 29,	10.15 A.M.	52,000
Do.	„ „	1.30 P.M.	42,000
Do.	„ „	2.15 P.M.	56,000

N.B.—Of course, the varying degree of moisture, the state of winds, &c., has to be taken into account.

There are many occupations which, unfortunately, involve the almost constant inhalation of a greater or less degree of dust. And all such occupations are more or less prejudicial to this delicate breathing mechanism. The sharper and more irritating the dust particles, the worse is their effect, and the workers are necessarily placed in a worse condition for withstanding the attacks of the vicious bacillus, which we have seen is the immediate cause of consumption. It would be impossible to indicate all these, but I may mention, by way of illustration—metal polishing, hewing, glass making, filing, tobacco manufacture, brush making, etc. And to prove that this has an important relation to the occurrence of phthisis, I shall submit to you a table, which shows the percentage of consumption in the total number of sick amongst workmen, exposed to the inhalation of dusts of various kinds.*

But I would have you to realise that while, doubtless, the dust particles play an important rôle, a most important factor is to be found in the *otherwise* vitiated atmospheres in which such occupations are carried on—in other words, the deficiency of a proper quantity of air in proportion to the number present. As illustrating this further, I should ask you to bear in mind that people who are much exposed to cold, such, for example, as our poor cabmen and tramway drivers, our fishermen and sailors, are, other things being equal, in my experience at least, less liable to consumption, largely because however much their exposure, they at least are allowed to breathe fresh air.

Men do not, then, get consumption from mere exposure to cold—provided they are sufficiently fed, and are wisely provident in their life, and careful to counteract the effects of *sudden changes* of temperature. It is only exposure to sudden changes which is likely to produce the serious "colds," which may undoubtedy prove the prelude to some worse.

(2.) This brings us to a consideration of the other direction in

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* Percentage of Phthisis in total number of sick amongst workmen exposed to the inhalation of dusts of various kinds:—

Metallic.		*Mineral.*	
Needle Polishers,	69·6	Flint Workers,	80·0
File Cutters,	62·6	Grindstone Makers,	49·0
Lithographers,	48·5	Stone Cutters,	36·4
Grinders,	40·4	Plasterers,	19·0
Dyers,	25·0	Porcelain Makers,	16·0
Painters,	24·5	Potters,	14·7
Printers,	21·6	Masons,	12·9
Tinkers,	14·1	Cement Makers,	8·0
Vegetable.		*Animal.*	
Cigar Makers,	36·9	Brush Makers,	49·1
Weavers,	25·0	Hair Workers,	32·1
Millers,	10·9	Turners,	16·0
Bakers,	7·0	Button Makers,	15·0
Mixed.		*No Dust.*	
Glass Cutters,	35·0	Shoemakers,	18·0
Glass Makers,	17·8	Glovers,	10·0
Day Labourers,	15·1	Butchers,	7·0

which impure air is dangerous. I have referred to the effect of dusty atmospheres in leading to irritation of the delicate passages —to the effect of sudden exposure to a change of temperature in producing catarrh of the air passages. Chronic catarrh of the air passages is certainly not a good thing itself. But the condition of affairs would be comparatively unimportant, were the air we breathe never impure through the presence of living organisms, and more particularly the tubercle bacillus, the irritated condition of the air passages permitting or leading to more certain inoculation with the deadly organism. This is no mere theory or fancy. We have abundant evidence for saying that the bacillus of consumption and its germs are abundantly found floating about the air under many conditions.

It is the easiest thing in the world to give a rabbit consumption by letting it inhale the finely divided expectoration of a consumptive patient. If we consider how freely the expectoration of consumptive patients is deposited on handkerchiefs, and alas! too frequently on our pavements, and even in dwellings, where it dries and then gets blown about as a fine dust, it is not difficult to conceive how certainly, with badly formed or badly acting chests, perhaps with an irritated or otherwise unhealthy state of the delicate passages and cells, the terrible disease of consumption is produced. Thus it is undoubtedly that we must seek for the explanation of the decimation from consumption which has occurred among soldiers in all parts of Europe—the very men, whom, by reason of the stringency of medical examination, ought to be practically excluded from this list. In their case we have the two potent factors of insufficient ventilation with often overcrowding, and exposure to the inhalation of expectorated tubercular matter, dried, broken up into dust, and floating in the air. (Farr.)

The improvement which has speedily followed the building of better ventilated barracks, and the more careful seclusion of the sick, supports this view. Still more recent observations go to show that the death-bringing organisms cling to the walls of houses where consumptive patients have lived and died, as surely as does the contagion of scarlet fever cling to the dress and bedclothes of the scarlatina patient.

And it is now many years since a distinguished French physician—long before the discovery of the tubercle bacillus—wrote of a nunnery where consumption was so common, that within ten years two or three relays of inmates were removed by its ravages. Perhaps still more striking is the following weird story, recorded, however, apparently on excellent authority.

A nun died at Bilboa of consumption: the furniture was burned, the walls, ceiling, and door washed, the floor taken up, and sand laid in its place. The cell was then tenanted by another nun, in perfect health and of an excellent constitution. In two months, she began to decline, her flesh wasted, the chest was attacked, the cough became worse and worse—in short, she died consumptive in eight months after taking possession of the cell. General cleaning followed. A third healthy nun succeeded, and died in the course of a year. New examinations took place, and it appeared that the cord near the bed, attached to the bolt of the door, had not been removed. This, it was said, was found impregnated with the sweat of the patients and with other noxious exhalations. It was removed, everything was renewed, and a fourth nun has lived in a healthy state in the same cell for five years.

Wherever we can fairly say that a patient has suffered from want, or has been exposed to any of these conditions leading to irritation or to imperfect action of his chest (and these are too numerous to be mentioned in detail), we are entitled to speak of predisposition to consumption, but just to the same extent as we are entitled to say that want and dirt predispose to typhus fever. In both cases, there must be in addition the presence and attack of a definite organism; the only difference being that the organism—the tubercle bacillus—which causes consumption can be shown to you on the screen, while the typhus-bearing organism has yet to be found.

This leads me to refer in a word or two to what is frequently spoken of as a certain *family predisposition* to consumption. Now, this doubtless exists, but it is more difficult to define exactly wherein it lies. Some families are similarly more easily affected by scarlatina—some by measles. For example, during an epidemic of any kind, some families escape entirely, while several or all members of others suffer—and the dose varies. Possibly in all cases it may be that the constitution of the patient is, as we may say, "softer," and softer in various subtle ways which have yet to be discovered. But most certain it is, that in many instances where consumption has been said to run in families, it has only run in families because the members of the family have been brought up on a common doubtful system, have been exposed to the same vicious hygienic condition, and, probably, in not a few instances, have infected each other.

The important thing—and, indeed, the conclusion of the whole matter—is that we bear clearly in mind that, whatever the predisposing causes (and these, as we have seen, are not to be trifled with), *there cannot be consumption without the Tubercle Bacillus;* and, on the other hand, however strong the subject—he may be possessed of the herculean frame of the athlete—*if the tubercle bacillus once gets, unchecked, a footing,* his strength will decline, and his flesh waste, from a true consumption.

There are still many things I should like to add in connection with this division of the subject, which time, unfortunately, will not permit.

With regard to the distribution of consumption, most of you already know that it is the most ubiquitous disease. It occurs with varying degrees of frequency in almost every land, as the map which I show you sufficiently indicates. From what I have said, it will be evident that it occurs most abundantly in overcrowded centres, and we may add that its frequency and severity is greater in moist, low-lying centres, especially where a damp subsoil exists under the dwellings. In any country, rooms built directly on the ground are always worse for the consumptive patient than those which are raised from the earth. Further, we know that its course is more rapid in warm countries than in cold. And, lastly, other things being equal, consumption is less common in elevated, hilly districts than elsewhere.

The terrible mortality of consumption is too well known to require more than a single word. When I remind you that one-seventh of all the persons who annually die throughout Europe, die of this disease, I have said enough. Of all who die between the ages of fifteen and forty-five, it has been calculated that one-third die of consumption. And the Registrar General's Report shows that during the year 1889, of 27,891 deaths from all causes in the eight principal towns of Scotland, no less than 9648, or one-third of the whole, were due to consumption and diseases of the chest.

Of the work of destruction wrought on the lungs and other organs and tissues of the sick man by the tubercle bacillus, and of the outward indications of the approach of this visitor feared by man, with which many of us are sadly familiar, it is not my province to speak here.

With a feeling of genuine and well-grounded hopefulness, I have to ask you to turn from the more gloomy to the brighter side of the picture, while we seek to answer the other question,

II. *How are we to get rid of consumption?*

Here, if anywhere, the old maxim is true, that "Prevention is better than cure." We shall, therefore, consider (1) preventive, and (2) curative, measures.

(1.) *Preventive.*—As I have indicated already, this is a question (*a*) for the individual, (*b*) for the community.

(*a*.) The best answer to the *individual* aspect of it is, "Don't get it." I mean by this, that all of us should be better armed with knowledge about the condition than circumstances have hitherto permitted. Men and women must know that the arrow that flieth by day is the same as the pestilence that walketh by night. Men must be taught—and babies too—*how* to breathe, and *where* to breathe, and *what* to breathe (see above), how to regulate their life in all directions, so as to keep the vastly important respiratory apparatus in the best condition to withstand the darts of the enemy, which, as we have seen, are flying about among us all. Even strong men and women—with no family history of consumption—must look to the joints of their armour. What has been said above will indicate to you *where* the bacillus is most likely to lurk, and *at what time* he is most likely to make a successful attack. Here knowledge is strength, and it will be more than ever the duty of each one, no less for his own sake than for that of his family and the community, to turn knowledge into efficient practice. Most especially must *no "cold" be neglected.* However little likelihood there is that a cold may pass on to the worse condition, the weakened resistance thus offered by the tissues is the best apology for an attack of the bacillus, and no one—least of all the unhappy host—can blame the hungry organism for migrating to quarters where board, lodging, and indefinite possibilities of colonisation are temptingly offered.

It must also be the endeavour of each to keep his vital powers generally at as high a level as possible. Conditions of low health —of varying kinds—are often the precursors of the more dreaded disease. This will be attained by a greater regularity in the times and character of meals, and by greater attention to exercise of one kind or another. Sedentary habits are one of the curses of our civilisation. For some, such exercise must, perhaps, be restricted to the daily walk to and from work. But walking is far better than a drive on the top of a car. Others can indulge in golf—and in these golden days of enlightenment, when our Town Council has purchased a magnificent golfing course just at our doors, there is abundant opportunity in Edinburgh for the practice of, perhaps, the most health-giving game in the world—practically without cost. Other games will suggest themselves, but from the present point of view it should be borne in mind that for people who have to work, the best exercise is that which is most easily available, which involves no abrupt strain of the bodily energy, and for the neglect of which there can, consequently, be no valid excuse. When the system is not definitely delicate, a cold tub every morning—it may be simply a dip, and should never be prolonged—affords one of the best means of keeping our heat-regulating mechanism in good order, diminishing the tendency to "take cold." For every one, but more particularly for the young developing chest, gymnastic exercise of some kind—even dumb-bells—by means of which defective chest architecture will be remedied, and the lazy part of the lung brought into play; and such exercise is preferably carried on in the open air, or in a room with the window open, *while the exercise is going on.*

Whenever a doubtful condition exists, the patient should seek a thorough examination from his physician. There would be no great harm, if, quite apart from illness, we had our bodily tenement examined every six months, just as we insist nowadays on having our dwelling-houses inspected. There is much wisdom in the principle of the Eastern sovereign, who pays his physician to keep him well.

(*b.*) So far as the *community* is concerned, the question raises wider issues. I do not now need to advocate the "airing" of our large cities by the leaving of open gardens and squares, and the widening of our streets, or the ventilation of our houses, schools, offices, and factories. We are all agreed as to the necessity for this. But it would be well if local authorities were always a little more active in the exercise of the far-reaching powers which they undoubtedly possess in this respect. From the community's point of view, fresh air and plenty of sunlight are the first and most certain means of getting rid of the germs of disease and the dirt in which they find their *habitat*.

So far as infectious conditions are concerned, as you know—thanks to the foresight and untiring energy of our veteran Medical Officer of Health—we live in peculiarly happy circumstances. All cases of infectious disease which occur within the city must now be reported and recorded at the city's expense; and the result is that within a very short time after the outbreak of an epidemic, it is known exactly at head-quarters how the disease is distributed, and special measures of investigation or treatment can be instituted. Again, it is similarly known if the epidemic continue longer in certain districts than in others, and an explanation may then be suggested. To-night I should press strongly for the inclusion of consumptive cases in such compulsory returns. Nothing but good can, in my opinion, result from this extension of a most valuable method. Were it adopted, we should soon have most valuable confirmation—or let us suppose, the opposite, although I do not think this latter likely—of the statements which have been made regarding the communicability of consumption, and the tendency to its occurrence in certain houses and districts. Edinburgh will make a big move—and a move, I make bold to say, in which she will be speedily followed by many—if her Medical Officer of Health will stimulate the authorities to this further development.

Again, when a death has occurred—and as is most usual, after prolonged illness—I should insist on the sleeping-room of the patient being disinfected as carefully as after the more generally recognised contagious conditions.

Still with a view of preventing the *spread* of phthisis among the very poor, for the community's sake, I should have a portion of our City Hospital—in lieu of any better institution elsewhere—devoted to the reception of dying cases of phthisis, whose surroundings and hygienic conditions are not only fatal to themselves but, in my judgment, eminently prejudicial to all those who are brought into the close contact with them which the life of a family in one or two rooms involves. Such cases cannot of course in any number be received into the Royal Infirmary, nor is it desirable that they should. But I desire to-night to rouse the citizens to the responsibility they assume in permitting such chronic sources of infection to smoulder in their midst under the conditions which are undoubtedly most calculated to lead to fatal propagation.

(2.) There is the more strictly *curative* aspect of the question. This is, of course, not the place for me to recommend a course of treatment for any hypothetical case of consumption. When symptoms of disease are present, a medical attendant must be called in, and the sooner the better. For half of our ill success in the treatment of phthisis results from the fact that patients—from various reasons—hang on far too long before they realise that their cold has been "neglected," often, unfortunately, till it is too late.

It is right, however, that I should ask you to disabuse your minds of the gloomy conception of consumption, that it is incurable. Earlier this evening I have told you of how the nations are vying with each other in this holiest of wars against the prince of the power of darkness. More rapid strides have been made in our conception of consumption and its treatment during the last eight years than ever before. In Paris, an International Congress for the discussion of the subject meets biennially; and most valuable researches on the subject are being carried out in the Institute of Pasteur. In Vienna, through the influence of Professor Schrötter, a big move is on foot for the establishment of special hospitals for the treatment and close observation of consumptive patients. At the tenth International

Congress in Berlin last August, there was an unanimous expression of opinion, from the vast gathering, that the advances which had recently been made in our conceptions of the pathology and treatment of consumption rendered imperative the institution of large hospitals in all our great centres for the treatment and education of phthisical patients—*i.e.*, for the purpose of indicating to patients how they may treat themselves.

Now I am especially glad to be able to remind you that Great Britain, to her everlasting credit, has been in the forefront in this matter. Long before the days of modern light in the pathology and treatment of consumption, England stood in the van of practical progress in this respect through the foundation of a large number of hospitals specially devoted to the treatment of phthisis. I daresay it will surprise some of you when I tell you that London alone possesses five such hospitals, with a clientèle of patients exceeding 45,000 annually. I show sketches which I have had prepared of the leading London hospitals, with their respective number of patients, including the National Hospital in the Isle of Wight.

Besides this, Liverpool has an hospital; and so have Manchester, Newcastle, and Belfast.

In Germany, there have sprung up within the last twenty or thirty years several hospitals or sanitaria, specially devoted to the treatment of consumption, largely on the initiative of the late Dr Brehmer, who is rightly regarded as the head of this movement, so far at least as Germany is concerned. A strong believer in the climatic element in treatment, without, of course, any knowledge of the essential cause of the disease, he put his views into practical shape, many years ago, by the foundation of the Sanatorium at Göebersdorf, of which, through the kindness of the physicians, I am able to shew you photographs. At Falkenstein, in the Taunus districts, similar large institutions, specially for the reception of phthisical patients, exist.

Up till recently Edinburgh has done little towards the practical solution of the vastly important problem. At the Royal Infirmary and Dispensaries of the city, the number of other patients is so overwhelming, and the urgency of many cases so great, that the chronic sufferer from chest disease has admittedly received less attention than the conditions of that ailment render desirable.

The Victoria Dispensary for Consumption and Diseases of the Chest was established at 13 Bank Street in 1887, as a modest jubilee offering from a sympathiser with these poor sufferers, and has since been maintained by the efforts of one or two interested friends. The records of the Institution show how conspicuously it has proved a blessing, and how thoroughly it has been appreciated.

It was opened on the 22nd November 1887, and, up to the close of October 1890, 1210 individual cases have been under the physician's care. Almost all the patients have required lengthened treatment, some having more than 100 visits. The Dispensary has been open three days a week, but the patients have been received daily, when the special line of treatment required it. Often more than 50 patients have been examined and treated in one day, and the average attendance per week has recently been over 100. The numbers have shown a steady rise throughout the whole period of its existence, and, latterly, they have grown out of proportion to the possibilities of the Dispensary as at present arranged. It is not saying too much to aver that in a very large number of cases serious illness has been checked, invalided men and women have been enabled to resume work, and others have obtained much needed palliation of sore suffering. Certainly the expressions of gratitude from many of the patients have been extremely touching.

These results afford, it is felt, the best argument for a powerful effort being made to extend the scope and increase the usefulness of the Institution. The most urgent want is for beds where some of the more clamant cases might be received for a time, till the worst of the storm be weathered, and where patients might really learn how to treat themselves. For close observation at the Dispensary has led to the conclusion that the sufferings of such patients are often needlessly increased through ignorance.

The Hospital, which must be established, and that very soon, I propose should be in the vicinity of Edinburgh, in some protected and sheltered spot, and here the patients suitable for admission would be received from the Dispensary in turn, and kept so long as their condition and the other demands on the institution warranted. There can be no doubt of the absolute necessity for such an institution in our midst; the cries of our consumptive sick and dying are going up to heaven for its foundation and endowment. I can imagine no more thorough practical outcome of this meeting than the united determination that within the next twelve months such an institution be opened to the consumptive sick in our midst. There are many people who would never miss £100, and there are some who would not miss £1000 or more, and there are the smaller offerings, which are possible to the many. With such gifts no delay need occur, and we can look forward to the approach of another winter season with easier minds and lighter hearts. I need not say that I shall have much pleasure in being the means of conveying to the treasurers, Messrs Wallace & Guthrie, W.S., 137 George Street, all the sums which you are good enough to entrust to me.

There is a further reason why particularly at this time we should be up and doing. You have all been reading lately—who has not?—of the further astounding discovery which Professor Koch has just made public to the scientific world. In the breast of the phthisical patient there proverbially lingers what is popularly known as the consumptive hope—"while the lamp holds on to burn" the most advanced phthisical does not despair. It would seem almost as if this had been a prophetic whisper from something impressed on his soul. In these latter days it would seem as if we were at the dawn of the grand morning from the night of death.

I would ask you to revert once more to that good genius, who, after years of most patient and marvellously skilled observation and judgment, revealed to the world in 1882 the Tubercle Bacillus. I would bid you think of him as he continues to observe and study his select bacilli cultures, as he learns their habits, their likes and dislikes, and especially as, with marvellous self-abnegation, he contrives schemes for the extermination of the organism, whose scientific father he was. Recognising the evil propensities of his godson, he sets himself to checkmate his movements, anxious to sacrifice his offspring for the good of humanity. Like one of the alchemists of old, he sits beside his retort and test tubes, pondering over the remedy, till calmly and judicially—knowing the responsibility he thereby assumes—he appears once more, in November 1890, as the discoverer of the *elixir vitæ* for the subject of tubercular disease.

It is yet premature to speak with absolute certainty on many points which the great discovery involves. More particularly, it is yet premature to attempt to limit the extent of its practical issues. But I should like, in the few words which I have yet to add, to endeavour to guide the more impulsive—and some, if they will pardon me saying it, who perhaps have their ears rather than their judgment open—to guide such to a standpoint, whence they may look round and survey with safety the wonders which undoubtedly exist, but which have not been minimised certainly in their passage through the visual, auditory, and graphic centres of some special correspondents.

In the first place, those of you who are sufficiently advanced in medical studies—and who is not in these days, especially towards the close of the Health Society's session?—I should strongly advise to fall back on the grand and simple statement of the master himself, which was published in the daily papers about the middle of November. The universal consensus of the scientific world is one of willingness to accept that statement *simpliciter*, for Koch's word in medical currency is as good as gold. There, untinctured by unwholesome vanity, or tarnished by any baser motive, you will read what personal observation in Berlin, and latterly in our Royal Infirmary, convince me is the simple truth. And if I felt certain that all of you who are interested in the matter would really go home and read and digest that statement, I should not say another word to-night.

But in case the spirit may be more willing now in some instances than later, and I have the advantage of your bodily presence, it will be my endeavour in a few sentences to give you what may help your further thought on this subject.

The wonderful "lymph"—of which I hand a few drops to our chairman—is a very simple looking fluid. It is transparent and brownish in colour—not unlike an East India sherry—with a characteristic odour, which I shall not attempt to describe. Of its chemical constitution Dr Koch does not speak, and, therefore, we must be more reserved. But from statements made by Dr Koch to His Excellency von Gossler, the German Minister of

Education, and from what I heard in Berlin, it seems likely that it contains one or more of the chemical resultants from the cultivation in given media of the tubercle bacilli, to which we have made frequent reference already. The process of elaboration and separation requires the greatest care, and Dr Koch has stated that it would take many weeks, and possibly months, for a practised worker to become thoroughly familiar with the method of preparation. This, along with the necessity for absolute uniformity of strength, explains the apparent delay in the distribution of the fluid. But I have it on the highest authority that every effort is being made to place it at the disposal of the public through accredited channels.

For purposes of treatment the fluid is diluted in distilled water to varying degrees, according to the nature of the case. But it will give you some idea of the potency of the remedy when I tell you that the 1-66th part of a drop of the original fluid is sufficient to produce a very definite change in the consumptive patient—both *general* and *local.* The healthy subject is not affected by such a dose, or, indeed, materially by one ten times as great. Professor Koch himself, determined to test its marvellous properties in their severest form, had the courage to inject into his own person as much as 3¾ drops. These produced sufficiently serious results, which are described in the original paper, but they passed off entirely in the course of a day or two, leaving the man, who had risked so much, as well as ever. It would thus appear that the fluid has a marvellous "elective affinity," in virtue of which it possesses the power, when introduced into the system, of finding its way straight to the seat of tubercular disease, however obscure or ill-defined this may be to external examination, and of there producing definite changes whose outward expression, doubtless, is the very definite reaction which so uniformly follows the injection of even so minute doses—for the first time—into the tubercular subject.

The operation of inoculation is of the simplest character, and does not differ materially from that of ordinary hypodermic medication by means of a subcutaneous syringe, as has long been used for the introduction of morphia, &c. The injection is generally made into the skin of the back.

After the introduction of a small dose for the first time into the "consumptive" patient, or the subject of tubercular disease of other kind, a very definite result follows with almost perfect certainty. This we divide with Professor Koch into a *general* and *local reaction.*

The *general* reaction appears in from four to six hours after injection, and consists in rise of temperature, shivering, headache, more or less sickness, and other symptoms which we usually associate with the onset of one of the acute fevers. The breathing becomes, as a rule, much more rapid, and this to a greater degree relatively than the pulse. Sometimes an eruption, somewhat resembling measles appears, generally on the surface of the skin. The symptoms vary in different cases. But this sketch is sufficient to give you a true idea of the nature of this general reaction. At the end of twenty-four to thirty-six hours these symptoms have probably all disappeared, and the interesting aspect of this part of the subject is that these symptoms are now not likely to be induced, at least to the same degree, unless the dose be increased.

The *local* reaction *does not show itself at the point of injection, but where the tubercular focus exists, however far removed that be.* This focus may be in the lungs (as in "consumption"), in the throat, in the bones, in the joints, in the skin, or, indeed, in almost any part of the body. The local effects are best *studied* in the case of "lupus," *i.e.*, a tubercular affection of the skin—due to the attack of the tubercle bacilli—and not unfrequently found on the face, leading to grave and ugly disfiguration. Such local reaction occurs at a varying period, from six to twelve hours after injection, and is evidenced by swelling and redness, in many cases to a very considerable degree, along with a subjective feeling of tension and burning. Soon an exudation begins to ooze from the surface, the yellow drops of which run together, forming crusts. This incrustation grows in thickness until it is tumbled off in a week or ten days—possibly longer—or is dislodged by the surgeon to admit of quicker healing. When it falls off naturally, it discloses a smooth, delicate surface of pale, red colour. Thus I have seen several cases of lupus to all intents cured, after from eight to twelve injections, and many more at different stages of their course towards apparently the same happy termination.

A more or less definite local reaction is distinctly traceable in connection with tubercular affections of glands, bones, and joints —to which I cannot refer now—so that all these afford substantive proof of the special or *specific* action of the "lymph" on all tubercular processes. When the lung is the part affected we cannot see the change, but there is abundant ground for saying that a definite local change goes on there too, presumably of a similar nature. The symptoms of the patient, and the sounds heard when the stethoscope is applied prove that a definite change is in process.

Not only this, but inoculation of the fluid sometimes makes evident tubercular affections in parts where hitherto they had apparently lain so dormant as to escape detection, both on skin in joints and glands, and apparently in the lungs. In other words, to use the old-fashioned phrase, in such cases, it seems to bring the mischief to the surface. From this power of flying to the affected part it will come to be, doubtless, a most important aid towards testing the constitution generally in many doubtful cases, where hitherto we have been at a loss.

Again, it promises to prove a most important *aid to diagnosis.* It sometimes happens that there is a difficulty in separating clinically between, say, a cancerous affection and a tubercular, and, perhaps, some other special process. It seems well established that the specific will act with almost unvarying certainty on the case, if tubercular, while if any of the others be present, the result will be negative.

With regard to the effects of *treatment,* I think we had better fall back meanwhile on the statement of the master himslf. Koch, who has not yet deceived us, categorically tells us that he has traced cure in cases of lupus, and in recent and slighter cases of glandular, bony, and joint tuberculosis, and slow improvement in severe cases. With regard to *early phthisis,* he is equally emphatic in the statement that such cases can be cured with certainty by this remedy. All that I have seen corroborates the statement regarding lupus and the slighter forms of tubercular manifestations referred to in connection with glands, bones, &c. Nothing which I have seen contradicts the words of the Savant regarding the *early* cases of phthisis, and much tends to corroborate it. As the time for observation since the publication has been too limited, I prefer, however, meanwhile to hold fast to the words of Dr Koch, whom I have never found to fail me when I have fallen back on his work hitherto.

With regard to the *later stages of* Consumption, our statement must be more guarded, and I should strongly urge you to be careful in your conception of the possibilities here. When the lungs are in a state of more or less general disintegration, the process ceases to be simple. The bacillus tuberculosis is now aided and abetted by other organisms, and the combined effect is to produce a very far-reaching destruction and disorganisation of the lung. You will wisely remember, then, that Koch has promised nothing definite here—I do not wish to exclude a possible amelioration—for Koch's fluid is a specific, and, therefore, presumably acts on tuberculous tissues only.

And this leads me to say that there appears to be no question that the action is not primarily on the tubercle bacilli, but rather on the tuberculous tissue. It affects living tubercular tissue, in such a way, apparently, that the tubercle bacilli, which were previously flourishing there, are starved for want of food.

This rather gloomy picture regarding the prospects in cases of very advanced phthisis, is brightened by the hope that, through Dr Koch's efforts, both patients and doctors will be made more alive than ever to the danger of so-called *neglected colds*, because unhappily, here at least, a time may be reached, when it may be "too late to learn" the gravity of the situation.

In conclusion, I should say, in regard to the cases which, through the kindness of Professors Grainger Stewart and Chiene, Dr Brakenridge, and others in the Royal Infirmary, I have been enabled to place under the new treatment, that, so far as a desire to be strictly impartial allows me to speak, my distinct opinion is that, here in Edinburgh, we have already confirmation of every position which I have thought it proper to maintain before you to-night.

I should add that the lymph which I received directly from Dr Koch—primarily in the interest of the Victoria Consumption Dispensary—has been solely used, up to the present, for the treatment of patients in private wards in the Royal Infirmary, a considerable proportion of these being selected patients from our

Consumption Dispensary list. The experience of those cases has strongly emphasised the wisdom of Koch's opinion regarding the necessity for the hospital treatment of such cases. In the more serious forms of tuberculosis, he says "medical art must have full sway by careful individualisation, and making use of all other auxiliary methods to assist the action of the remedy. In many cases I had the decided impression," he continues, "that the careful nursing bestowed on the patient had a considerable influence on the result of the treatment, and I am in favour of applying the remedy in proper Sanatoria, as opposed to treatment at home and in the out-patient room."

Ladies and Gentlemen,—I have finished. It has been my endeavour to give you an outline of the present position of medical thought—in some of its more advanced flights—regarding this most dreaded scourge of this country. If I have wearied you or kept you too long, I must beg you to admit as excuse my desire to place you in a right position for judging calmly, reasonably, and yet hopefully, all that you may henceforth chance to read regarding the disease.

Earlier in the evening, when I spoke of the dawn of a grand morning, I am very sure I did not exaggerate. While I ask you to be careful to follow the example of Koch himself in respect of caution in accepting all you hear, and of rigidly testing all facts, where that is possible, I would also ask you to believe—on the authority of Koch, whose whole course has proved him to be a man of probity and truth, undisturbed by the petty motives which have sometimes tarnished otherwise good work—that the fine morning is *not* going to break down, but that the noontide splendour of the completed and tested work will be no less grand than its early promise. When the sun is fully up, we shall see clearly many things, in this and other fields, we now hardly dream of.